

Appendix A
Water Quality Objectives
for
Indicator Bacteria

A Water Quality Objectives for Bacteria Indicators

Under section 304(a) of the Clean Water Act, the USEPA is required to publish water quality criteria accurately reflecting the latest scientific knowledge for the protection of human health and aquatic life. Prior to 1986, the USEPA recommended bacteria criteria based on fecal coliforms to protect human health.¹ In 1986, the USEPA recommended the use of criteria based on *Escherichia coli* (*E. coli*) for fresh waters and *Enterococci* for fresh and marine waters rather than the use of criteria based on fecal coliform.² The USEPA recommended this change in the use of bacteria indicator organisms because the USEPA studies demonstrated that *E. coli* and *Enterococci* are better predictors of the presence of gastrointestinal illness-causing pathogens than fecal and total coliforms and hence provide a better means of protecting human health. Subsequent supporting research led the USEPA to reaffirm these findings in 2002.³ The USEPA strongly recommends the replacement of water quality objectives based on fecal or total coliforms with objectives based on *Enterococci* and *E. coli*.

In January 2005 the State Water Resources Control Board (State Water Board) adopted an amendment to the *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan) that maintained the total and fecal coliform water quality objectives (WQOs). Additionally, the State Water Board added provisions that required additional monitoring if the single sample maximum water quality objectives are exceeded. Water quality objectives for *Enterococci* were also added to the Ocean Plan at this time.

As described below, the *Water Quality Control Plan for the San Diego Basin (9)* (Basin Plan) contains objectives based on fecal and total coliform as well as *Enterococci* and *E. coli* for inland surface waters, enclosed bays and estuaries and coastal lagoons.

A.1 REC-1 Water Quality Objectives in the San Diego Region

The contact recreation (REC-1) beneficial use water quality objectives for bacterial indicators applicable in the San Diego Region are contained in the Ocean Plan and in the San Diego Water Board's Basin Plan. The objectives contained in both are derived from water quality criteria promulgated by the USEPA in 1976 and 1986. The Ocean Plan currently contains REC-1 objectives for total and fecal coliforms and *Enterococci*. The Basin Plan currently contains REC-1 objectives for total coliform, fecal coliform, *Enterococci* and *E. coli* as shown below.

¹ Quality Criteria for Water. USEPA 1976

² Ambient Water Quality Criteria for Bacteria. USEPA 1986

³ Implementation Guidance for Ambient Water Quality Criteria for Bacteria. May 2002 DRAFT.

REC-1
Ocean Waters (from Ocean Plan)

Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board (i.e., waters designated as REC-1), but including all kelp beds, the following bacterial objectives shall be maintained throughout the water column:

30-day Geometric Mean – The following standards are based on the geometric mean of the five most recent samples from each site:

- i. **Total coliform** density shall not exceed **1,000** per 100 ml;
- ii. **Fecal coliform** density shall not exceed **200** per 100 ml; and
- iii. **Enterococcus** density shall not exceed **35** per 100 ml.

Single Sample Maximum:

- i. **Total coliform** density shall not exceed **10,000** per 100 ml;
- ii. **Fecal coliform** density shall not exceed **400** per 100 ml;
- iii. **Enterococcus** density shall not exceed **104** per 100 ml; and
- iv. **Total coliform** density shall not exceed **1,000** per 100 ml when the fecal coliform/total coliform ratio exceeds 0.1.

REC-1
Inland Surface Waters, Enclosed Bays and Estuaries and Coastal Lagoons
(from Basin Plan)

Fecal Coliform / Fresh or Marine Waters: Fecal coliform concentration, based on a minimum of not less than five samples for any **30-day period**, shall not exceed a **log mean of 200** per 100 ml, nor shall more than **10 percent** of total samples during any **30-day period** exceed **400** per 100 ml.

Total Coliform / Bays and Estuaries only: Coliform organisms shall be less than **1,000** per 100 ml (10 per ml); provided that not more than **20 percent** of the samples at any station, in any **30-day period**, may exceed **1,000** per 100 ml (10 per ml) and provided further that no **single sample** when verified by a repeat sample taken within 48 hours shall exceed **10,000** per 100 (100 per ml).

Enterococci / Fresh Waters: In fresh water, the **geometric mean** of *Enterococci* shall not exceed **33** colonies per 100 ml. The **single sample maximum** allowable density in designated beach areas is **61** colonies per 100 ml, in moderately or lightly used areas is 108 colonies per 100 ml, in infrequently used areas is 151 colonies per 100 ml.

Enterococci / Marine Waters: In marine waters, the **geometric mean** of *Enterococci* shall not exceed **35** colonies per 100 ml. The **single sample maximum** allowable density in designated beach areas is **104** colonies per 100 ml, in moderately or lightly used areas is 276 colonies per 100 ml, in infrequently used areas is 500 colonies per 100 ml.

***E. coli* / Fresh Waters:** In fresh water, the **geometric mean** of *E. coli* shall not exceed **126** colonies per 100 ml. The **single sample maximum** allowable density in designated beach areas is **235** colonies per 100 ml, in moderately or lightly used areas is 406 colonies per 100 ml, in infrequently used areas is 576 colonies per 100 ml.

A.2 REC- 2 Water Quality Objectives in the San Diego Region

The non-contact (REC-2) beneficial use water quality objectives for bacterial indicators applicable in the San Diego Region are contained in the Basin Plan and are derived from water quality criteria promulgated by the USEPA in 1976.

REC-2 Inland Surface Waters, Enclosed Bays and Estuaries and Coastal Lagoons (from Basin Plan)

Fecal Coliform / Fresh or Marine Waters: In waters designated for non-contact recreation (REC-2) and not designed for contact recreation (REC-1), the average fecal coliform concentrations for any **30-day period**, shall not exceed **2,000** per 100 ml, nor shall more than **10 percent** of total samples collected during any **30-day period** exceed **4,000** per 100 ml.

A.3 Shellfish Harvesting Water Quality Objectives in the San Diego Region

The shellfish harvesting (SHELL) beneficial use water quality objectives for bacterial indicators applicable in the San Diego Region where shellfish may be harvested for human consumption are contained in the Ocean Plan and in the Basin Plan. Both are derived from water quality criteria promulgated by the USEPA in 1976.

SHELL Ocean Waters (from Ocean Plan)

At all areas where shellfish may be harvested for human consumption, as determined by the Regional Board, the following bacteria objectives shall be maintained throughout the water column:

The median **total coliform** density shall not exceed **70** per 100 ml, and not more than **10 percent** of the samples shall exceed **230** per 100 ml.

SHELL Enclosed Bays and Estuaries and Coastal Lagoons (from Basin Plan)

Total Coliform / Marine Waters: The median total coliform concentration throughout the water column for an **30-day period** shall not exceed **70** per 100 ml nor shall more than **10 percent** of the samples collected during any **30-day period** exceed **230** per 100 ml for a five-tube decimal dilution test or 330 per 100 ml when a three-tube decimal dilution test is used.